

## WORKING DRAFT BDCP HCP/NCCP Biological Goals and Objectives

***Note:** This handout presents revised biological goals and objectives recommended by the Biological Goals and Objectives Working Group for incorporation into the Working Draft Chapter 3, Conservation Strategy. These biological goals and objectives will continue to be revised to incorporate goals and objectives for terrestrial species and in response to new information derived from analyses to be conducted in early 2009 (e.g., results of DRERIP evaluations, results of the impact assessment).*

### Ecologically Hierarchical Organization of Biological Goals and Objectives

The biological goals and objectives are organized hierarchically, on the basis of ecological scale, as follows:

1. Ecosystem Goals and Objectives
2. Natural Community Goals and Objectives
3. Species-Specific Goals and Objectives

The scope of each ecological scale is as follows:

- **Ecosystem Goals and Objectives.** Ecosystem goals and objectives are focused on improvements to the overall condition of hydrological, physical, chemical, and biological processes in the Delta in support of achieving goals and objectives for covered natural communities and covered species.
- **Natural Community Goals and Objectives.** Natural community goals and objectives are focused on maintaining or enhancing ecological functions and values of covered natural communities. Achieving natural community goals and objectives also serve to conserve the habitat of associated covered species and other native species.
- **Specific Goals and Objectives.** Species-specific goals and objectives address species-specific stressors and habitat needs that are not addressed under the higher order ecosystem and natural community goals and objectives and species-specific viability parameters as they relate to life stage occurrence of covered fish species in the Delta.

### Ecosystem Goals and Objectives

**Goal ECSY 1:** Provide hydrodynamic conditions within Delta waterways that contribute to viable populations of covered fish species.

**Problem Statement:** *Hydrodynamic conditions within the Delta affect covered fish species stressors associated with life stage movement among habitats, straying, habitat*

conditions, and food production. Maintaining or improving these hydrodynamic functions will relieve the adverse effects of these stressors on covered fish species.

**Objective ECSY1.1:** Provide hydrodynamic conditions that support the movement of larval and juvenile life stages of covered fish species to downstream rearing habitats.

**Objective ECSY1.2:** Provide hydrodynamic conditions that support the movement of adult life stages of covered fish species to upstream spawning habitats.

**Objective ECSY1.3:** Provide a range of salinity conditions that support habitat and food production for covered fish species.

**Goal ECSY 2:** Increase primary and secondary production to increase the abundance and availability of food for all life stages of covered fish species.

**Problem Statement:** *Insufficient primary and secondary production is hypothesized to be an important stressor on delta smelt, longfin smelt, and juvenile salmonids. Increasing primary and secondary production will improve food web processes and the availability and abundance food items at multiple trophic levels for covered fish species.*

The following ecosystem and natural community objectives that also contribute towards achieving this goal: ECSY1.3, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

**Objective ECSY2.1:** Over the term of the BDCP, increase the abundance of zooplankton species that provide food and support food production for covered fish species in Delta waterways.

**Goal ECSY 3:** Reduce the adverse effects of non-native species on the Delta's aquatic ecosystem and the productivity, abundance, distribution of covered fish species.

**Problem Statement:** *Excessive levels of competition with and predation by non-native species on covered fish species is hypothesized to be a major stressor on covered fish species directly through predation mortality and indirectly through food abundance and availability. Reducing the adverse effects on non-native species on covered fish species is expected to increase survival and abundance of covered fish species.*

**Objective ECSY3.1:** Manage the distribution and abundance of established non-native invasive species in the Delta to reduce non-native species predation on and competition with covered fish species.

**Objective ECSY3.2:** Manage the distribution and abundance of established non-native invasive species in the Delta to rehabilitate aquatic ecosystem processes.

**Objective ECSY3.3:** Minimize the likelihood for future invasions and establishment of non-native species into the Delta's aquatic ecosystem.

**Goal ECSY 4:** Reduce the adverse effects of contaminants on the Delta's aquatic ecosystem and the productivity, abundance, distribution of covered fish species.

**Problem Statement:** *A variety of contaminants entering Delta waterways are hypothesized to have direct lethal and sublethal effects on life stages of covered fish species and food web processes that adversely affect food abundance and availability. Reducing the loads of contaminants entering the Delta that are known to have these adverse effects is expected to increase survival and abundance of covered fish species.*

**Objective ECSY4.1:** Contribute to reducing the load of contaminants of concern that enter the Delta in wastewater treatment plant discharges to levels in conformance with existing and future water quality standards to reduce their effects on and biological uptake by covered fish species.

**Objective ECSY4.2:** Contribute to reducing the load of contaminants of concern that enter the Delta from urban sources to levels in conformance with existing and future water quality standards to reduce their adverse effects on and biological uptake by covered fish species.

**Objective ECSY4.3:** Contribute to reducing the load of methyl mercury entering the Delta from in-Delta and upstream sources to levels in conformance with existing and future water quality standards to reduce adverse effects of methyl mercury on and biological uptake by covered fish species.

**Objective ECSY4.4** Contribute to reducing the load of contaminants of concern entering the Delta from in-Delta and upstream sources from agricultural practices in conformance with existing and future water quality standards to reduce their adverse effects on and biological uptake by covered fish species.

**Objective ECSY4.5:** Coordinate efforts to detect and respond to toxic events in the Delta.

**Goal ECSY5:** Provide for the spatial distribution and connectivity of covered species habitats across the Delta to support the effective movement and genetic exchange of covered species within and among natural communities both inside and outside of the BDCP planning area.

**Problem Statement:** *Poor connectivity among and accessibility to habitat areas required to fulfill the life stage requirements of covered species is hypothesized to inhibit the abundance and distribution of covered species and the diversity and growth of their populations. Maintaining connectivity and accessibility to habitat areas that support life*

*stage requirements will support improved abundance, distribution, diversity, and growth of covered species populations.*

The following ecosystem and natural community objectives also contribute towards achieving this goal: ECSY1.1-1.3 and NACO1.1-1.5.

**Objective ECSY5.1:** Provide the hydrodynamic and salinity and other water quality conditions within the Delta that support the effective movement of all life stages of covered fish species between spawning, larval, juvenile, and adult habitat areas.

**Objective ECSY5.2:** Contribute to the availability of well-distributed restored floodplain, riparian, tidal marsh, and shallow subtidal aquatic habitats to support increased distribution of covered species and improved connectivity among covered species habitats within and adjacent to the BDCP planning area.

## Covered Natural Community Goals and Objectives

**Goal NACO1:** Protect, enhance, and restore tidal perennial aquatic, freshwater and brackish tidal marsh, and riparian communities to provide habitat and ecosystem functions to increase the natural production (reproduction, growth, and survival), abundance, and distribution of covered species.

**Problem Statement:** *[To come.]*

**Objective NACO1.1:** Increase the frequency that floodplain habitat within the Yolo Bypass is inundated for at least █ consecutive days to approximately █ percent of years.

**Objective NACO1.2:** Provide for the inundation of at least █ acres of historical floodplain surfaces that have been disconnected from river channels to provide habitat and ecosystem functions that support of covered species.

**Objective NACO1.3:** Restore, manage, and protect at least █ acres of freshwater tidal marsh in the Delta that provides habitat and ecosystem functions in support of covered species.

**Objective NACO1.4:** Restore, manage, and protect █ acres of brackish tidal marsh in Suisun Marsh/Bay to provide habitat and ecosystem functions in support of covered species.

**Objective NACO1.5:** Restore at least █ acres of riparian forest and scrub within the Delta to provide habitat and ecological functions in support of covered species.

**Goal NACO2:** Conserve sufficient agricultural, grassland, natural seasonal wetland, non-tidal perennial aquatic, and non-tidal perennial permanent emergent marsh communities in the Planning Area to contribute to the conservation of associated covered species.

**Problem Statement:** *[To come.]*

**Objective NACO2.1:** Increase the extent of protected agricultural lands within the Planning Area that are managed to support habitat for associated covered species.

**Objective NACO2.2:** Increase the extent of protected grasslands within the Planning Area that are preserved as habitat for associated covered species.

**Objective NACO2.3:** Increase the extent of protected natural seasonal wetlands, including vernal pools and their micro-watersheds, within the Planning Area that are preserved as habitat for associated covered species.

**Objective NACO2.4:** Increase the extent of protected non-tidal perennial aquatic and associated non-tidal perennial permanent emergent marsh communities within the Planning Area that are preserved as habitat for associated covered species.

## Covered Species Goals and Objectives

### General Covered Fish Species

**Goal GECF1:** Increase the abundance of covered fish species by reducing sources of unnatural mortality.

**Problem Statement:** *Non-natural sources of mortality are hypothesized to Poor connectivity among and accessibility to habitat areas required to fulfill the life stage requirements of covered species is hypothesized to inhibit the abundance and distribution of covered species and the diversity and growth of their populations. Reducing the proportion of covered fish species populations that are subject to loss from these mortality sources will support improved abundance, distribution, diversity, and growth of covered fish species populations.*

**Objective GECF1.1:** Reduce entrainment of covered fish species at non-project diversions.

**Objective GECF1.2:** Reduce entrainment of covered fish species at the Banks Pumping Plant and the Jones Pumping Plant.

**Objective GECF1.3:** Reduce entrainment of covered fish species into the SWP and CVP north Delta diversion intakes in the BDCP long-term implementation period.

**Objective GECF1.4:** Contribute towards reducing the risk for dissolved oxygen sags in Delta and Suisun Marsh waterways that could result in mortality of covered fish species.

**Objective GECF1.5:** Minimize the adverse effects of harvest on covered fish species.

**Goal GECF2:** Reduce impacts of hatcheries on the genetic integrity of artificially propagated and natural populations of covered fish species.

**Problem Statement:** *Non-natural sources of mortality are hypothesized to Poor connectivity among and accessibility to habitat areas required to fulfill the life stage requirements of covered species is hypothesized to inhibit the abundance and distribution of covered species and the diversity and growth of their populations. Reducing the proportion of covered fish species populations that are subject to loss from these mortality sources will support improved abundance, distribution, diversity, and growth of covered fish species populations.*

**GECF2.1:** Minimize the adverse effects of salmonid hatcheries on the genetic integrity of wild Chinook salmon and steelhead populations.

**GECF2.2:** Maintain or establish genetic refugia for delta smelt and longfin smelt to reduce the risk for the extinction of delta smelt and the extirpation of longfin smelt.

## Delta Smelt

**Goal DESM1:** Contribute to conditions that support a viable population of delta smelt in the Delta and Suisun Bay.

**Problem Statement:** *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives that also contribute towards achieving this goal: ECSY1.1-1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECF1.1-1.4, and GECF2.2.

**Objective DESM1.1:** Contribute to maintaining the existing distribution of delta smelt in the Delta and Suisun Bay and expanding the distribution of delta smelt the eastern and southern Delta such that the number of gravid and spent adult

delta smelt sampled from Spring Kodiak Trawl Eastern and Southern Zone survey stations is similar to that sampled from [year] to [year].<sup>1</sup>

**Alternate 1-Objective DESM1.2:** Contribute to increasing the abundance of delta smelt within the Delta and Suisun Bay such that, in any five year period, the combined Fall Midwinter Trawl (FMWT) catch for September and October will exceed 29 in two years and the two-year running average will never fall below 84.<sup>1</sup>

**Alternate 2-Objective DESM1.2:** Contribute to increasing the abundance of delta smelt within the Delta and Suisun Bay such that, in any ten year period, the FMWT index will not be less than 100 and will exceed 500 in at least three years and exceed 1,000 in at least one of the ten years.<sup>1</sup>

**Objective DESM1.3:** Increase habitat availability for all delta smelt life stages in the Delta and Suisun Marsh/Bay.

**Objective DESM1.4:** Increase delta smelt stock recruitment in years of comparable hydrology relative to hydrological conditions observed from [year] to [year].

## Longfin Smelt

**Goal LOSM1:** Create conditions that support a viable population of longfin smelt in the Delta and Suisun Bay.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives that also contribute towards achieving this goal: ECSY1.1-1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECSF1.1-1.4, and GECSF2.2.

**Objective LOSM1.1:** Contribute to increasing the abundance of delta smelt within the Delta and Suisun Bay such that, in wet water years the FMWT index will be at least 5,000 and the FMWT index does not decline below 100 in any year.<sup>2</sup>

**Objective LOSM1.2:** Increase the abundance of longfin smelt within the Delta and Suisun Bay relative to mean abundance indices for [year] to [year] based on results of FMWT surveys.

<sup>1</sup> This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

<sup>2</sup> This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

**Objective LOSM1.3:** Increase habitat availability for all longfin smelt life stages in the Delta and Suisun Marsh/Bay.

**Objective LOSM1.4:** Increase longfin smelt stock recruitment in years of comparable hydrology relative to hydrological conditions observed from [year] to [year], such that in wet years the FMWT index will be at least 5000 and the FMWT will not fall below 100 in any year.

## Chinook Salmon

**Goal CHIN1:** Increase the survival of juvenile Chinook salmon passing through the Delta.

**Problem Statement:** *Mortality rates of juvenile Chinook salmon attributable to multiple factors within the Delta are hypothesized to be excessive and a factor inhibiting the growth of Chinook salmon populations. Reducing mortality rates of juvenile Chinook salmon in the Delta will support improved abundance, distribution, diversity, and growth of Chinook salmon populations.*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECSF1.1-1.5, and GECSF2.1.

**Objective CHIN1.1:** Increase the survival of juvenile Sacramento Basin spring-run Chinook salmon passing through the Delta to Chipps Island in the BDCP near-term implementation period by █ percent, fall/late fall-run Chinook salmon by █ percent, and winter-run Chinook salmon by █ percent from mean survival rates observed from [year] to [year].

**Objective CHIN1.2:** Increase the survival of juvenile Sacramento Basin spring-run Chinook salmon passing through the Delta to Chipps Island in the BDCP long-term implementation period by █ percent, fall/late fall-run Chinook salmon by █ percent, and winter-run Chinook salmon by █ percent from mean survival rates observed from [year] to [year].

**Objective CHIN1.3:** Increase the survival of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island in the BDCP near-term implementation period by █ percent from mean survival rates observed from [year] to [year].

**Objective CHIN1.4:** Increase the survival of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island in the BDCP long-



term implementation period by █ percent from mean survival rates observed from [year] to [year].

**Objective CHIN1.5:** When a spawning population of spring-run Chinook salmon established in the San Joaquin River, provide for survival of San Joaquin Basin spring-run Chinook salmon passing through the Delta to Chips Island in the BDCP long-term implementation period of at least █ percent.

**Goal CHIN2:** Increase the growth of juvenile Chinook salmon that pass through and rear in the Delta to increase the likelihood for survival of juvenile Chinook salmon in San Francisco Bay and ocean habitats.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY2.1, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

**Objective CHIN2.1:** Increase the mean weight and length of juvenile Sacramento Basin spring-run Chinook salmon, fall/late fall-run Chinook salmon, and winter-run Chinook salmon passing through the Delta to Chipps Island.

**Objective CHIN2.2:** Increase the mean weight and length of juvenile San Joaquin Basin fall-run Chinook salmon passing through the Delta to Chipps Island.

**Goal CHIN3:** Maintain or increase life history diversity of all runs of Chinook salmon.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.

**Objective CHIN3.1:** Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for all runs of Chinook salmon over time.

**Goal CHIN4:** Increase the proportion of all runs of adult Chinook salmon that successfully migrate upstream through the Delta to upstream spawning habitats.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECEF1.4, GECEF1.5, and GECEF2.1.

**Objective CHIN4.1:** Provide flow conditions that minimize occurrences of false attraction of all runs of adult Chinook salmon into non-natal basins.

**Objective CHIN4.2:** Increase the passage of all runs of Sacramento Basin adult Chinook salmon past the Fremont Weir into the Sacramento River by █ percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

**Objective CHIN4.3:** Increase the passage of all runs of San Joaquin Basin adult Chinook salmon past the Stockton Deep Water Ship Channel by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods Chinook salmon are present.

## Central Valley Steelhead

**Goal STEE1:** Increase the survival of juvenile steelhead passing through the Delta.

**Problem Statement:** Mortality rates of juvenile Central Valley steelhead attributable to multiple factors within the Delta are hypothesized to be excessive and a factor inhibiting the growth of the steelhead population. Reducing mortality rates of juvenile steelhead in the Delta will support improved abundance, distribution, diversity, and growth of the Central Valley steelhead population.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.3, ECSY4.1-4.5, ECSY5.1-5.2, NACO1.1-1.5, GECSF1.1-1.5, and GECSF2.1.

**Objective STEE1.1:** Increase the survival of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island in the BDCP near-term implementation period by █ percent from mean survival rates observed from [year] to [year].

**Objective STEE1.2:** Increase the survival of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island in the BDCP long-term implementation period by █ percent from mean survival rates observed from [year] to [year].

**Objective STEE1.3:** Increase the survival of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island in the BDCP near-term implementation period by █ percent from mean survival rates observed from [year] to [year].

**Objective STEE1.4:** Increase the survival of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island in the BDCP long-term

implementation period by [ ] percent from mean survival rates observed from [year] to [year].

**Goal STEE2:** Increase the growth of juvenile steelhead that pass through and rear in the Delta to increase the likelihood for survival of juvenile steelhead in San Francisco Bay and ocean habitats.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY2.1, ECSY3.2-3.3, ECSY4.1-4.5, ECSY5.2, and NACO1.1-1.5.

**Objective STEE2.1:** Increase the mean weight and length of juvenile Sacramento Basin steelhead passing through the Delta to Chipps Island.

**Objective STEE2.2:** Increase the mean weight and length of juvenile San Joaquin Basin steelhead passing through the Delta to Chipps Island.

**Goal STEE3:** Maintain or increase life history diversity of Central Valley steelhead.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.

**Objective STEE3.1:** Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for Central Valley steelhead over time.

**Goal STEE4:** Increase the proportion of adult Central Valley steelhead that successfully migrate upstream through the Delta to upstream spawning habitats.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECF1.4, GECF1.5, and GECF2.1.

**Objective STEE4.1:** Provide flow conditions that minimize occurrences of false attraction of all runs of steelhead into non-natal basins.

**Objective STEE4.2:** Increase the passage of steelhead past the Fremont Weir into the Sacramento River by [ ] percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

**Objective STEE4.3:** Increase the passage of San Joaquin Basin adult steelhead past the Stockton Deep Water Ship Channel by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods steelhead are present.

## Sacramento Splittail

**Goal SASP1:** Maintain and conserve a viable population of Sacramento splittail in the Delta.

**Problem Statement:** *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1, ECSY1.3, ECSY2.1, ECSY3.1-3.4, ECSY4.1-4.4, ECSY5.1-5.2, , NACO1.1-1.5, GECF1.1-1.5.

**Objective SASP 1.1:** Implement a new comprehensive monitoring program for Sacramento splittail in their current range with multiple mark recapture techniques as designed by the Department of Fish and Game.<sup>3</sup>

**Objective SASP 1.2:** Contribute towards increasing the abundance of Sacramento splittail within the Delta and Suisun Bay in the near-term implementation period such that the following conditions are met.

1. The FMWT numbers will exceed 19 or greater for seven of 15 years, the Suisun Marsh catch per trawl will exceed 3.8 for seven out of 15 years, and young-of-year abundance will exceed 3.1 per trawl for at least three out of 15 years (splittail young-of-year abundance can be applied to meet the total abundance (i.e., 3.1 young per trawl can be applied to meet the 3.8 target).

2. Bay Study otter trawl numbers will be 18 or greater and catch of young-of-year will exceed 14 for 3 out of 15 years.<sup>4</sup>

**Objective SASP1.3:** Contribute towards increasing the abundance of Sacramento splittail within the Delta and Suisun Bay in the long-term implementation period

<sup>3</sup> This objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

<sup>4</sup> This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

to achieve target abundance values based on the new monitoring program established under Objective SASP1.1.<sup>5</sup>

**Objective SASP1.4:** Maintain the distribution of Sacramento splittail within the Delta and Suisun Bay to achieve target distribution values based on the new monitoring program established under Objective SASP1.1.<sup>5</sup>

**Objective SASP1.5:** Provide increased spatial availability of Sacramento splittail spawning habitats.

**Objective SASP1.6:** Maintain multiple spawning cohorts of Sacramento splittail as part of the breeding population as indicated by first dorsal ray aging data collected under the new monitoring program established under Objective SASP1.1.<sup>5</sup>

## Green Sturgeon

**Goal GRST1:** Increase the proportion of green sturgeon that successfully migrate upstream through the Delta to upstream spawning habitats.

**Problem Statement:** *[To come.]*

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECEF1.4, and GECEF1.5.

**Objective GRST1.1:** Provide flow conditions that minimize occurrences of false attraction of adult green sturgeon into non-natal basins.

**Objective GRST1.2:** Increase the passage of adult green sturgeon past the Fremont Weir into the Sacramento River by  percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

**Objective GRST1.3:** Provide for the potential reestablishment of green sturgeon in the San Joaquin River by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods adult green sturgeon are migrating to spawning habitats.

**Goal GRST2:** Increase juvenile green sturgeon habitat availability.

**Problem Statement:** *[To come.]*

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<sup>5</sup> This quantified objective has been proposed by DFG and is undergoing evaluation by the Biological Goals and Objectives Working Group.

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY5.1, and NACO1.1-1.4.

**Objective GRST 1.1:** Increase the spatial distribution of juvenile green sturgeon within the Delta.

**Goal GRST3:** Maintain or increase life history diversity of green sturgeon.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.

**Objective GRST3.1:** Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for green sturgeon over time.

## White Sturgeon

**Goal WHST1:** Increase the proportion of white sturgeon that successfully migrate upstream through the Delta to upstream spawning habitats.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.2, ECSY4.4, ECSY5.1, NACO1.1, GECE1.4, and GECE1.5.

**Objective WHST1.1:** Provide flow conditions that minimize occurrences of false attraction of white sturgeon into non-natal basins.

**Objective WHST1.2:** Increase the passage of white sturgeon past the Fremont Weir into the Sacramento River by  percent from the passage efficiency provided by the existing Fremont Weir fish ladder.

**Objective WHST1.3:** Increase the passage of white sturgeon past the Stockton Deep Water Ship Channel by contributing towards maintaining dissolved oxygen levels of at least 5 ppm within the Stockton Deep Water Ship Channel during periods white sturgeon are present.

**Goal WHST2:** Increase juvenile white sturgeon habitat availability.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.3, ECSY5.1, and NACO1.1-1.4.

**Objective WHST 2.1:** Increase the spatial distribution of white sturgeon within the Delta.

**Goal WHST3:** Maintain or increase life history diversity of white sturgeon.

**Problem Statement:** [To come.]

The following ecosystem, natural community, and general covered fish species objectives also contribute towards achieving this goal: ECSY1.1-1.3 and ECSY5.1.

**Objective WHST3.1:** Provide for flows through the Delta that reflect the variability present in the natural hydrograph to provide for a diversity of rearing conditions for white sturgeon.

## River Lamprey

**Goal RILA1:** Maintain the ecological functions of the Delta that support a viable population of river lamprey in the Central Valley.

**Problem Statement:** [To come.]

**Objective RILA1.1:** Provide flow conditions that support upstream migration of adult river lamprey through the Delta to upstream spawning habitats.

**Objective RILA1.2:** Maintain sufficient low salinity zone holding habitat to support the abundance of river lamprey needed to successfully metamorphosis and outmigrate from the Delta to maintain a viable Central Valley population.

## Terrestrial Covered Species

[To come.]